ENGINEERING RESEARCH CENTERS

Partnerships with Industry, Academe, and Government
for
Next-Generation Advances in Engineered Systems
Research, Technology, and Education

Program Announcement

Division of Engineering Education and Centers
Directorate for Engineering
National Science Foundation

Notice of Intent Due: November 2, 1998
Pre-Proposal Deadline: January 14, 1999
Full-Scale Proposal Deadline: June 30, 1999
Site Visits: September through November 1999
Awards: March 2000

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NATIONAL SCIENCE FOUNDATION

Engineering Research Centers Program Announcement and Guidelines for Submission of Pre-Proposals

The Division of Engineering Education and Centers in the Directorate for Engineering is accepting pre-proposals from academic institutions to establish approximately six Engineering Research Centers (ERC) in FY 2000.

THE ERC CONCEPT

Engineering Research Centers provide an integrated environment for academe and industry to focus on next-generation advances in complex engineered systems important for the Nation's future. Activity within ERCs lies at the interface between the discovery-driven culture of science and the innovation-driven culture of engineering, creating a synergy between science, engineering, and industrial practice. ERCs provide the intellectual foundation for industry to collaborate with faculty and students on resolving generic, long-range challenges producing the knowledge base for steady advances in technology and their speedy transition to the marketplace. These Centers form long-term, trusted partnerships between academe and industry and develop a culture where graduate and undergraduate students work in cross-disciplinary teams, in close collaboration with their industrial partners. ERCs integrate engineering education and research and expose students to the integrative aspects of engineered systems and industrial views in order to build competence in engineering practice. They produce curriculum innovations derived from the systems focus of the ERC's strategic goals and engineering graduates with the depth and breadth of education needed for leadership throughout their careers. Thus, ERC graduates enjoy the capacity to contribute to the Nation's global future through a rich spectrum of career paths at the cutting edge of technical progress and innovation.

In its first decade of operation, the ERC Program has validated the Foundation's strategic interests in the integration of research and education, trusted partnerships with industry, the development of shared infrastructure, and enablement of the capacity of science and engineering graduates to contribute to the Nation. The Program has been a model for the development of Centers programs in the U.S. and around the world. Together, NSF and industry have developed a partnership with a shared vision for long-term engineering research and education. This partnership has produced a new generation of graduates who have proven to be more effective in industry, as well as numerous innovative, next-generation engineered systems technologies, productive engineering processes, and other innovative products and services. Thus ERCs contribute to industry's ability over the long run to compete in global markets.

KEY FEATURES OF AN ERC

An ERC has the following defining characteristics or key features:

- A guiding, **strategic vision** to produce advances in **a complex, next-generation engineered system** and a corresponding new generation of engineers needed to strengthen the competitive position of industry and the Nation in a global economy;

- A dynamic, evolutionary **strategic research plan** to focus and integrate the ERC to achieve its vision;

- A cross-disciplinary **research program**, promoting synthesis of engineering, science and other disciplines, spanning the continuum from discovery to proof-of-concept in testbeds, involving undergraduate and graduate students in research teams;

- An active, long-term **partnership with industry** and practitioners in planning, research, and education to achieve a more effective flow of knowledge into innovation and a new generation of engineers to benefit the Nation;

- An **education program** for undergraduate and graduate students, enabling an integrative, systems-oriented intellectual environment and curriculum innovations;

- **Leadership** to guide and develop the ERC and a **cohesive team** effort, integrating engineering and scientific backgrounds with industrial views, that is also **diverse** in gender, race, and ethnicity;

- **Outreach** and **connectivity** to other institutions to enhance capacity of the ERC to achieve its goals and broaden the impact of the ERC culture in academe and society;

- **Supporting infrastructure** of management systems; space to facilitate cross-disciplinary collaboration in the ERC, experimental and enabling equipment and facilities; and **university commitment** to facilitate, reward, and sustain the ERC culture; and

- Funds and in-kind support from industry, academe, and other sources to **substantially leverage** NSF's support.

LONG-TERM SELF-SUFFICIENCY OF ERCs

NSF expects ERCs to become self-sustaining and to maintain the ERC culture beyond the end of their term of NSF support. By that time, they will have developed an effective and productive collaboration with industrial and other stakeholders who are deriving a range of benefits from these partnerships. They should be prepared to continue that productive relationship with university, industrial, and other support when NSF funding ceases.

VALUE ADDED OF NEW ERC OVER PRIOR ERC OR OTHER TYPE OF CENTER

Teams that involve members of former ERCs, of ongoing ERCs at the end of their term of NSF support, or of other types of centers are eligible to submit proposals to establish new ERCs. Proposals with teams derived from these types of centers will be subjected to the same review process, under the same review criteria, as are teams who have no prior center-level experience. Thus, there is neither a negative nor a positive bias toward such teams in the proposal review and award decision processes. However, it is imperative that they demonstrate substantially new visions in research and education and the potential for a substantial value added over all aspects of their prior work to justify an NSF investment.

WHO MAY SUBMIT

U.S. academic institutions with undergraduate and graduate engineering programs, granting the Ph.D. degree in engineering**,** may submit pre-proposals as the lead institution of an ERC. The Center Director, the NSF Principal Investigator, must be a faculty member from the lead university. More than one proposal may be submitted by a university, and a university may be the lead institution on more than one ERC proposal, as long as there is no significant overlap in the faculty and students involved. A university that is a core partner in an ongoing or proposed ERC, may submit as a lead institution or core partner in another ERC. A university that is already the lead in an ongoing ERC may submit a proposal to establish another ERC.

INSTITUTIONAL CONFIGURATION OF AN ERC

ERCs may be single university efforts or they may be multi-university efforts. NSF has no preferences. Thus, the core team may be drawn from a **single university**, if the needed critical mass to achieve the goals of the ERC is available in sufficient strength and breadth in the faculty of that institution. If not, the ERC may be configured with **one lead university and one or two other long-term core partner universities.** NSF expects the lead and long-term core partner universities will function as an integrated, codependent whole, with shared research and education goals, shared aspects of their curricula, and a shared program of industrial collaboration. In the multi-institution ERC, the Center Director must be a faculty member of the lead university.

If the ERC is configured with a lead university and one or two long-term core partner universities, the lead university accepts the overall management and financial responsibility for the Center. The lead university receives the funds from NSF and other sources and disperses them to the other partners based on their role in the strategic plan and their performance. In addition, the ERC may involve federal laboratories as partners but NSF funds may not support their staff.

Whether a proposed ERC comprises one university or a lead university and one or two core partner universities, the ERC is expected to add a limited number of individual faculty from other academic institutions as **outreach partners in research**. The purpose of this outreach is to network the ERC's research with faculty and students at other institutions to enhance the capacity of the ERC to fulfill its research goals and to share the ERC culture with others. At the pre-proposal and full-proposal stages, NSF expects the specific identification of a limited number of research outreach partners for year one only. Plans for the general nature of this research outreach beyond year one should be included by referencing the skills and disciplines needed, but specific partners should not be identified. The ERC may also connect with other institutions to fulfill its human resource development, pre-college, technology transfer or other goals.

LEADERSHIP AND MANAGEMENT OF AN ERC

The Director of an ERC is the leader of a complex enterprise, developing and leading a team of faculty, staff, students, and industrial partners to fulfill a shared vision. The Center Director is the NSF Principal Investigator (PI) and has primary responsibility for administering the award in accordance with the terms and conditions of the Cooperative Agreement to be issued by the NSF in the event of an award. Since one of the primary objectives of an ERC is to impact engineering education, the Center Director should be a member of the faculty in a School or College of Engineering and a member of the faculty of the lead university in a multi-university ERC.

It is expected that the Director will form a leadership team comprised of an Associate Director(s), and leaders of research teams who will provide assistance to the Director in fulfilling the goals of the ERC. To be effective, an ERC also requires an Administrative Director who is responsible for the day-to-day administration and financial management of the Center. That person is supported by a small office staff. There is also an Industrial Liaison Coordinator to facilitate industrial membership and collaboration. In addition, there is an Associate Director for Education, a faculty member, who leads the curriculum development efforts; and, depending on the scope of the education program and any educational or human resource development connectivity proposed, there may be staff members devoted to these efforts as well.

DEVELOPMENT OF AN ERC PRE-PROPOSAL

The Vision, Rationale, and Supporting Infrastructure

A prospective ERC team begins by developing a ten-year vision for advances in a next-generation engineered system and corresponding educational innovations that will yield an exciting and compelling ERC in which to invest public and private sector funds. The vision should be at the engineered systems level, rich with scientific and engineering barriers to be overcome, full of opportunities for advances in knowledge and technology, and worthy of a ten-year investment by NSF and industry. Industrial personnel and other practitioners, as appropriate, should be involved in the efforts to contribute to the generation of the vision, scope, and strategy of an ERC. For an ERC with a vision that impacts the infrastructure systems underlying an effective economy, the vision should be broad enough to encompass research on public policy and regulatory issues; and, in this case, the partners may also include public agencies. NSF has no preferences regarding the technological focus of an ERC; however, if there is an ongoing ERC in the topic area, the team should justify how their efforts will complement the efforts of that ERC and add significant value to the existing state-of-the-art.

Having defined its vision, the ERC team should carry out an analysis of the current state-of-the-art in research and education, including documentation of the contributions made in the field by the prospective ERC's faculty and others around the world. The team should determine the key intellectual challenges which pose barriers to advances in knowledge, technology, and education that must be addressed to fulfill the vision. The vision will become more focused through this analysis.

An integral part of an ERC is strategic planning. The strategic plan is used to organize and integrate the Center's research to achieve its deliverables and vision. The rationale for the strategic research plan for the ERC should be derived from the analyses of the state-of-the-art and barriers. As a part of the development of the ERC's pre-proposal, the team should develop a figure that presents a visualization of the plan. From the figure, it should be clear how the engineered-systems goal of the ERC drives the fundamental and enabling technology research to achieve the ERC's deliverables. Developing this figure is an important analytical process for the prospective ERC team. The scope of the ERC should include research that spans the continuum from discovery through enabling technology to proof-of-concept in testbeds to achieve preliminary "realization" of the engineered systems

deliverables of the ERC, increase their relevance to industry, and speed their use. There are sample figures in the Research Management chapter of "ERC Best Practices Manual," (http://www.erc-assoc.org) that can serve as a beginning point for this analysis. The ERC program is open to many different types of approaches to visually represent this strategic plan. This type of chart should be accompanied by a milestone or "road map" type of figure that shows, through time, the "focus" of the key components of the research and the planned advances in knowledge and technology, their relationship to key testbeds, and their interdependencies. The time period should be the proposed ten-year scope of the ERC, with more detail for the first five years.

In education, the scope includes changes in the culture of engineering education and research to provide a team-based, interdisciplinary arena for research for undergraduate and graduate students, in partnership with industry. The scope of the ERC's impact on the curriculum is at the undergraduate, graduate, and life-long learning stages of education. The scope also includes the development, testing, implementation, and dissemination of curricular advances derived from the ERC's research. To add a new dimension to education, an ERC may also add a focus on design/build or product development experiences for students and other innovations.

The prospective ERC team should understand that NSF expects the ERC to assume a National leadership position in research and education in its field. This will be achieved in part through the scope and productivity of the ERC over time. It will also be achieved through outreach in research and selected types of connectivity in education and other areas. An ERC will be expected to develop outreach to faculty and students in the U.S. or abroad for involvement in research on a limited scale. The purpose of this outreach is to enhance the capacity of the ERC to achieve its goals and expand the exposure to the ERC culture.

The ERC team should also plan for selected connectivity/outreach with other institutions and partners to expand the impact of the ERC culture on education and human resource development. This connectivity can focus on human resource development through joint projects with institutions where there are large numbers of women or underrepresented minorities to increase their involvement in research and enhance their education through involvement in the ERC culture. However, this type of outreach should complement the ERC's effort to increase the diversity of its own faculty and students, not serve as a substitute for that effort. Connectivity may be used to develop partnerships with state governments to increase the impact of the ERC on the development of its state's economy. The ERC also may develop partnerships with local small businesses for the further exploration and development of new technologies. It may choose to include new approaches to preparing the technical workforce for the future or it may explore means to bring the excitement and challenge of engineering careers to K-12 students. An ERC is not expected to address all these types of connectivity initiatives, but should plan to develop a few of these or other types during the course of its 10-year span in order to achieve an expected national and local impact.

The prospective Director and the initial team of faculty should carry out an analysis of the infrastructure needed to support the ERC to fulfill its vision and goals. This analysis should include a study of the mix of disciplines and fields of expertise needed to fulfill the vision of the ERC. The outcome of this analysis might be an expansion of the core team by adding faculty from the available pool; or, where there is no suitable expertise, adding a few slots for new faculty or adding faculty through long-term core partnerships with other universities. In any case, the ERC will be expected to have a limited program of outreach as explained above. The team should carry out an analysis of the extant and needed space and experimental and enabling equipment. To be effective an ERC needs headquarters sufficiently large to house its staff, provide meeting space, and provide space that will enable the collaboration of faculty and students across laboratory and departmental lines.

This analysis should also include a determination of the relevant industries/practitioners needed as partners in the ERC. Contacts should be made early in the process to engage these potential partners in the development of the ERC. While specific commitments for financial support are not required or expected at the pre-proposal stage, these potential partners should understand that commitments for this support will be expected if the team reaches the full-scale proposal stage, as will commitments for their active involvement in planning, research, and education. There is no prescribed level of industrial support expected in an ERC, rather the judgement of the review panels and NSF will depend upon the industry/sector involved and its typical patterns of support and involvement with academic research. Support is in the form of cash and in-kind.

If the pre-proposal reaches the full-scale proposal stage, the lead university and any long-term core partner universities are expected to cost share the ERC with NSF and industry. Universities contributing faculty to the research outreach program or universities, colleges and other institutions involved in connectivity efforts are not

expected to cost share. This cost sharing can be in the form of cash, equipment, new faculty positions, etc. There is no prescribed minimum level of cost sharing.

The team should be mindful that NSF will look for a major value added over the prior work of the team and the work of others in the field. Thus, ERC funding through this announcement will not be used to replace funding by NSF or other agencies to fulfill the past goals of an ERC or another type of Center, of a group, or of separate individuals. In addition, ERC funds will not support a collection of unrelated, independent projects.

In preparation of the pre-proposal, the prospective ERC team should consult the ERC Home Page, http://www.eng.nsf.gov/eec/erc.htm , for information about ongoing ERCs and access to their WWW home pages. Proposers may also consult the "ERC Best Practices Manual," at http://www.erc-assoc.org . This is a document developed by members of the ongoing and self-sufficient ERCs to share insights and guidance about how to fulfill the challenges of an ERC. It is not an NSF publication.

AWARDS, AWARD INSTRUMENT, DURATION AND SIZE, OVERSIGHT, RENEWAL AND SELF-SUFFICIENCY, AND REPORTING REQUIREMENTS

Number of Awards: NSF expects to make awards to initiate approximately six new ERCs as an outcome of this competition, pending availability of funds and the quality of the proposals.

Award Instrument: Awards will be administered under a Cooperative Agreement in accordance with the NSF Grant General Conditions (GC-1) and Cooperative Agreement General Conditions (CA-1), copies of which are available on the NSF Home Page at: http://www.nsf.gov/home/grants.htm . More comprehensive information is contained in the NSF Grant Policy Manual (NSF 95-26), available on the NSF Home Page at: http://www.nsf.gov .

Award Duration, Size, and Long-Term Self-Sufficiency: An ERC begins operation under a cooperative agreement that has a potential duration of ten years. The initial award under that agreement has a potential duration of five years, renewable in year three for five years and in year six for four years. If an ERC is not renewed at either of those points in time, it is phased down in two years. ERC's are expected to be self-sufficient from ERC Program support after year ten. The level of annual support provided by NSF will be commensurate with the funding needed to build and sustain the ERC. The first-year level of NSF support may be between $1.5 million and $2.5 million, depending on the scope of the ERC. In subsequent years, NSF's support may grow to between $2.5 to $4 million through year six, again depending upon the scope of the ERC. After year six, NSF support will decline to shift the balance of support to industry and other sources to prepare the ERC to be self-sufficient at the end of ten years.

NSF Performance Reviews: ERCs undergo annual reviews of performance and plans to strengthen them, and renewal reviews to determine whether or not NSF's support should continue. ERCs that fail to achieve renewal will receive phase-down support for two years.

Reporting Requirements: Operating Centers are required to submit annual reports on progress and plans as well as summary reports on progress and plans for renewal. These reports are used as a basis for assessing annual performance and determining levels of continued funding. These reviews are carried out by reviewers external to NSF through a site visit format. In addition, ERCs are required to develop a data base of performance indicators for submission annually to NSF. These indicators are both quantitative and descriptive and include, for example, the number and characteristics of Center personnel; sources and amounts of financial and in-kind support; expenditures; names of member firms and characteristics of industrial participation; research accomplishments and impacts; technology transfer activities and their impacts; patents, licenses, and publication activity; and degrees granted to students involved in Center activities, etc. They should also develop systems to keep track of the career paths of their graduates.

Upon completion of the term of their cooperative agreements, ERCs are required to submit an NSF Final Project Report. Applicants should review the sample form in the NSF Grant Proposal Guide (GPG), NSF 98-2 prior to the pre-proposal submission so that appropriate tracking mechanisms are included in the project plan to ensure that complete information will be available at the conclusion of the Center's life under ERC Program support. The GPG is available via electronic mail: pubs@nsf.gov or it is available on the NSF Home Page at: http://www.nsf.gov/home/grants.htm .

ERCs also are required to submit a more comprehensive summary final report to the ERC Program, summarizing the Center's major achievements and accomplishments in all dimensions. Formats for this report are sent to the ERC during its last year. Data from the ERC's data base of indicators of performance will contribute to the preparation of this report.

THE TWO-STAGE ERC COMPETITION

Proposers compete for support from the ERC program in a two-stage process. The first stage consists of a notice of intent and a pre-proposal. At the completion of the review of the pre-proposals, NSF will invite a small number of the most highly qualified proposing ERC teams to prepare a full-scale proposal. All other pre-proposals will be declined at that time. No full-scale proposals will be accepted without a pre-proposal and a subsequent invitation. All full-scale proposals not selected for an award will be declined after awards are made.

A format for the pre-proposal is included in this announcement. The format for the full-scale proposal will be sent to those invited to submit. The major differences between the two scales of proposals can be found in the summary of requirements table at the end of this announcement. In addition, NSF does not require financial cost-sharing by participating lead and partner universities in the pre-proposal but it will be required in the full-scale proposal. NSF also does not require commitments for participation or financial support from industrial partners in the pre-proposal but these will be required in the full-scale proposal.

REVIEW PROCESS AND CRITERIA

Pre-proposals and full-scale proposals will be evaluated in accordance with established NSF policies. Pre-proposals will be evaluated through a combination of individual and panel review by experts from academe, industry, and government. Full-scale proposals will be evaluated through a combination of individual, panel review, and site visits by experts from academe, industry, and government. Teams of ERCs from site-visited proposals will make presentations to a review panel of outside experts as the final stage in the review process.

These reviews will be carried out using these two merit criteria: "What is the intellectual merit of the proposed activity? What are the broader impacts of the proposed activity?" approved by the National Science Board on March 28, 1997 (http://www.nsf.gov/home/grants.htm). These criteria have been integrated with the ERC key features to yield the following ERC decision factors which are the basis for the review process. They are used in the review in the following order of priority. These criteria are used in the review of both pre- and full-scale proposals unless otherwise stated.

ERC Decision Factors (All factors are considered in the review, in the following order of priority.)

Vision, Research , Leadership and Team

- Compelling vision for a complex next-generation engineered system that will be the foundation for major innovations to benefit industry and the Nation in a global economy;

- Strategic plan that effectively organizes and integrates the research to achieve the goals of the ERC;

- Research that is high quality with sound and innovative methodologies, appropriately cross-disciplinary, enables the flow and recycling of knowledge from discovery to proof-of-concept in testbeds and back, with significant value added over the state-of-the-art, and challenges/barriers that are worthy of a 10-year investment by NSF and industry;

- Director who is capable of developing and leading a complex enterprise and a team that is high quality, with the appropriate expertise and shares the vision;

- Outreach in research that will significantly and effectively enhance the impact of the ERC and its ability to effectively fulfill its vision;

Industrial Collaboration, Education, and Connectivity

- Industrial membership that involves a broad spectrum of firms/practitioners, with appropriate mix of sectors in the industry, that are committed, share the vision, and will be actively involved in planning, research, and education (potential is judged at the pre-proposal stage and degree of commitment is judged at the full-scale proposal stage);

- Industrial collaboration strategy that will yield effective movement of knowledge into practice;

- Education program that will provide unique opportunities to integrate the ERC's systems view into the curriculum, will build competence in engineering practice, and involve teams of undergraduates and graduates in cross-disciplinary research; if a multi-university ERC, students from the lead and core partner universities will experience significant benefit from a cross-university research/educational experience;

- Curricular innovations that will significantly improve engineering education for undergraduate and graduate students and practitioners; are worthy models for other universities that will be tested, implemented, evaluated, and shared;

- Plans for connectivity that enhance the impact of the ERC on human resource development, the pool of students interested in engineering, on the technical workforce, or on local economic development.

Infrastructure

- Strong management systems, and university policies that support the ERC culture; effective cross-institutional management and communication, if a multi-university ERC;

- Headquarters space for the ERC that facilitate cross-disciplinary collaboration and experimental equipment that support the experimental nature of the research of ERC;

- Academe, industry and others provide financial and other support to significantly leverage NSF's investment **(not considered at the pre-proposal stage)**; and

- ERC and its university(ies) are committed to involving faculty and students who are diverse in gender, race, and ethnicity to enhance the diversity of the engineering workforce;

Overall Value Added (Summary judgement criteria used at the end of each review and at the end of the process)

- ERC represents a synergy of research, education, and industrial collaboration that cannot be achieved

through other means of support, a significant value added over the state-of-the-art and prior efforts of the proposers, and a compelling investment for NSF and industry to make in partnership to benefit the Nation.

THE PRE-PROPOSAL STAGE

Notice of Intent

Teams intending to submit a pre-proposal should submit a notice of intent, not to exceed 500 words. The notice should be sent via email to: ercintent@nsf.gov **by November 2, 1998**. The purpose of the notice is to enable NSF to develop a reviewer base before pre-proposals are submitted. The notice of intent is not mandatory. Proposers who do not submit this notice may submit pre-proposals.

At the top of each page of the notice the following information should be provided: title of the ERC, name of the lead institution and any other core partner institutions, the names and affiliations of the Center Director and the Associate Director(s). The notice should provide a brief (500 word) narrative of the vision of the Center, the key barriers to be addressed by the research program, the expected deliverables in knowledge, enabling technology, and engineered-systems technology, the structure of the research program (including the names of its research clusters or thrusts), the goals and strategy of the industrial/practitioner collaboration and technology transfer program, the goals and deliverables of the education program, and the goals of any connectivity activities.

In addition to the 500 word narrative, the notice of intent also should provide a list on a separate page with the following information: the name of the lead university, the names of any core partner universities, and the names of the ERC Director, Associate Director(s), other key faculty, with their disciplines and institutional affiliations, and the names and institutions of research and any educational/human resource development outreach partners identified only for year 1. That list should be followed by a list of the names of the firms or other organizations committed to being or interested in being an industrial/practitioner partner at that point in time, with the names of the individual(s) who are the key points of contact for the ERC in each individual firm.

Preparation of the Pre-Proposal

Pre-proposals must be prepared according to the following format and must contain **only the materials requested by this announcement.** Copies of the required forms are contained in the NSF Grant Proposal Guide (GPG) (NSF 98-2). This announcement is available on the NSF Home Page at: http://www.nsf.gov/home/programs/recent.htm and no printed copies are available from NSF.

Preparation Guidance for the Pre-Proposal

The narrative of the pre-proposal will be no longer than 20 pages of text, including lists, charts, figures, and tables required as a part of the narrative or placed there by the proposers. The required page numbering should run from the beginning to the end of the narrative section. The other requirements are outside these page limits.

The pre-proposal must be prepared using a **12 point font**, with single line spacing. Note the font required is larger than that required in the GPG at the request of ERC reviewers. Pre-proposals should be prepared with the reviewer in mind. Illustrations of complex concepts should be used to improve communication.

Applicants are required to prepare and submit **only** the cover sheet using NSF FastLane (http://www.fastlane.nsf.gov) . This will facilitate tracking. Detailed instructions for submitting cover sheets through NSF FastLane are available on the FastLane Home Page at http://www.fastlane.nsf.gov/a1/newstan.htm . Within FastLane, on the cover sheet in the block "Program Announcement/Solicitation No./Closing Date," enter "NSF 98-

146." Once the cover sheet is submitted via FastLane, print the cover sheet, which will then have the NSF proposal number on it, and include it in each of the copies of the proposals you mail to NSF. Since the Engineering Research Centers Program proposals are not standard NSF proposals, the rest of the proposal cannot be submitted via FastLane.

Only one (1) copy of NSF Form 1225, Information about Principal Investigator/Project Director, should be sent attached to the original signed proposal.

Format for the Pre-Proposal

(1) Cover Sheet (NSF 98-2, Form 1207, page 1, all copies; pages 1 and 2, original copy only): This form must be signed by the Principal Investigator (Center Director), the Associate Director(s) as Co-Principal Investigator(s) and an official authorized to commit the lead institution in business and government affairs. The Engineering Research Centers (ERC) Announcement Number NSF 98-146 should be designated as the Program Announcement/Solicitation Number/Closing Date in the upper-left hand corner of the form. "EEC" should be listed as the NSF Organizational Unit. Include page 2 only with the pre-proposal copy containing the original signatures**.**

(2) Information about the Principal Investigator (NSF 98-2, Form 1225). Attach one copy to the original, signed copy of the proposal. Do not attach it to any of the other copies, since this would compromise the confidentiality of the information.

(3) Lists of Academic Participants, Industrial, and Other Partners: Provide two lists: (a) a List of Academic Participants and (b) a List of Industrial and Other Partners.

> **List of Academic Participants:** Begin the list of academic participants, with the name of the institution which will lead the ERC, followed by the name(s) of any core partner institution(s) which will form the long-term institutional structure for the ERC. Provide a list of the faculty who are committed to long-term involvement in the ERC, with their names, departmental, school, and institutional affiliation(s). These would be faculty from the lead university and any core-partner universities**.** Research outreach faculty and their institutions should be listed for **year 1 only**. Educational connectivity/outreach faculty and their institutions should be listed here as well.
>
> **List of Industrial/Practitioner Partners:** On this list, provide the names, professional titles, and corporate, agency, or other affiliations of industrial, practitioner, and other personnel who are interested in participating in and financially supporting the Center as users. At this stage interest is sufficient.

(4) Project Summary (NSF 98-2, Paragraph II.D.2) (one page)

A statement of the vision, research, industrial collaboration/technology transfer, education, and any connectivity components of the ERC. List the title of the ERC, the name of the Center Director, and the name of the ERC's lead and any core partner institutions at the top, center of the page.

(5) Table of Contents: Organize the Table of Contents to follow the outline requested by the pre-proposal format **not** the outline specified by the official NSF Table of Contents in the NSF Grant Proposal Guide (NSF 98-2).

(6) Narrative (not to exceed 20 pages)

The narrative should be structured according to the following outline and the page count starts from here.

- **Vision and Rationale for the ERC**

  Provide a statement of the vision of the ERC, its engineered systems focus, and its value to industry/practitioners and the Nation in a global economy. Provide an analysis of relevant work in the field by ERC participants and others in the US and abroad. Indicate the major barriers and challenges upon which the ERC will focus its research to achieve the vision, and the major advances in fundamental knowledge, technology, and education that the ERC expects to deliver. Justify the need or rationale for the

ERC based on this analysis and its value to industry and the Nation.

- **Strategic Research Plan for the ERC**

  Provide the ERC's strategic research plan to organize and integrate the research program to address these barriers, produce the expected deliverables, and achieve the ERC's engineered systems-level goals. Develop a figure to succinctly portray the ERC's strategic Plan over a ten-year period. Follow this with a summary milestone chart or road map depicting the key points of research, knowledge and technology deliverables, testbeds, and their interdependencies over ten years, with greater detail in years one through five.

- **Research Program**

  Derived from the Strategic Plan, provide an overall description of the organization of the research program into manageable clusters or thrusts of projects designed to address common barriers and deliverables. Describe codependency of the thrusts and how information will flow back and forth between them over time to achieve the ERC's overall goals and deliverables. Describe the role of proof-of-concept testbeds designed to explore the ERC's engineered systems goals in the research program.

  Provide an analysis of the critical mass of faculty needed to support the ERC's research goals, the needed disciplines, fields of expertise, and experience. This should include faculty from the lead university and from any core partner universities. For research outreach there should be discussion of the fields needed in the first five years, but the faculty named should be the limited number of faculty to be associated with the ERC in **year one only**.

  For each thrust area, provide a rationale for the research and give examples of its key research barriers and deliverables. Relate the work of the thrust to the work performed by the faculty involved and others in the US and abroad, explaining how the ERC's research will create value added over the state-of-the-art. Describe exemplar research projects so the reviewers will understand how the barriers will be addressed, what novel ideas will be pursued, and what methodologies will be used. For each thrust area, provide a table that shows the expected themes of projects, faculty involved by name, discipline, and university affiliation.

- **Industrial/Practitioner Collaboration and Technology Transfer Program**

  Provide information on how the industrial/practitioner collaboration program will be structured to achieve their involvement in strategic planning, research and education. Provide a rationale for inclusion of different sectors of the industry, e.g., manufacturers, suppliers, service providers/ practitioners, etc. Discuss how the ERC will organize industrial/practitioner input. Discuss the ERC's strategy for technology transfer. Discuss any connectivity partnerships to enhance the impact of the ERC on technology transfer at the state or local level.

  In this section, provide a table listing the names of the firms interested in or already committed to involvement at this stage of the ERC, grouping the firms by the sectors involved (manufacturers, suppliers, service providers, practitioners, etc.). Mark the firms according to whether they are already committed to involvement in the ERC or merely interested at this stage. Commitment and financial and/or in-kind support are not required at the pre-proposal stage.

- **Education Program**

  Provide a brief description of the goals of the ERC's education program. Describe how the ERC proposes to develop a team-based research/educational culture that will involve undergraduates and graduates in cross-disciplinary research with an industrial perspective. Discuss the goals for curriculum innovations and how they will be developed, tested, evaluated, implemented, and disseminated beyond the ERC. Discuss

any other educational innovations the ERC will undertake.

If the ERC is a multi-university ERC, with a lead university and one or two long-term core partner universities, discuss how the students in each institution will derive benefits from the ERC's education program, how curricular advances developed in the ERC will be shared, and means to facilitate ERC-related educational integration across the universities.

Include a description and rationale for any connectivity/outreach initiatives in education and human resource development.

- **Infrastructure of the ERC: Institutional Configuration, Leadership, Management and Organization, Equipment, University Policies.**

  Justify the institutional configuration of the ERC. Describe its leadership and management team. Describe the system to evaluate project-level performance and select projects. Describe the ERC's management system and organizational structure, its advisory system, and its method of project selection and evaluation. Provide an organization chart showing its configuration, reporting, and advisory system. An ERC Director usually reports to the Dean of Engineering; however, when the ERC involves a major component of faculty from other schools, such as the Business School or the College of Arts and Science. etc., the Director should report to the Dean of Engineering but provision should be made to team the other relevant Dean(s) with the Dean of Engineering. If this is a multi-institutional ERC, describe the management and communication systems that will be used to develop a fully integrated ERC. Briefly describe the space where the ERC will be housed and the extant and needed experimental and enabling equipment of the ERC. Indicate how university tenure, reward, and other policies will facilitate the ERC culture.

(7) References Cited (NSF Form 1361). Not included in the narrative page limit.

Appendices: All the appendices below are required. **(Pre-proposals with appendices other than those required below will be returned to the proposer without review)**

A. Letters of support from University Official of Lead University and any Core Partner University(ies).

Letters are required from the lead university and any core partner academic institution(s), signed by the Dean of Engineering, other Deans as appropriate, and Provost or other Institutional representative. These letters should indicate the role of the proposed ERC within the institution's strategic plan. Institutional cost-sharing is not expected or required at the pre-proposal stage. Letters should not be included from the institutions of any research outreach faculty. Letters should be provided from institutions involved in educational or other type of connectivity outreach.

B. Letter Expressing Interest from Potential Industrial and other Partners of the ERC.

Letters from industrial and other partners are required indicating how this ERC will be of value to the firm/partner and of value to the industry/practitioners in general. These should include statements of how the firm/partner anticipates it will participate in the ERC. Financial commitment is not expected or required at this stage.

C. Budget Estimates

Complete a budget estimate for the expected support from NSF for Year one, using **NSF Form 1030**. Cost-sharing should not be listed at the pre-proposal stage.

For multi-university ERCs: The lead school officials sign the 1030. Current "estimates" of the amount of funds anticipated to be distributed to the other core partner universities to fulfill their role in the ERC should be shown on Section G, line 5, Subawards. Actual distributions would depend upon the role and productivity of their faculty in the ERC's strategic plan. Funds to be distributed to universities and other institutions through the ERC's research outreach and any connectivity programs should be included in Section G, Line 5, Subawards. A notation should be made in the budget explanation as to the allocation for each institution. In accordance with OMB Circular A-21, the lead university may include in its modified total direct cost base only the first $25,000 of each subaward to a core

partner university, regardless of the period covered by the subaward. Because the first award would cover a five-year period of performance, each subaward to a core partner university should be based on the same five-year period of performance, with the "first $25,000 of each subaward" referring to the first $25,000 of the cumulative five-year budget for each subaward.

D. Biographical Sketches (NSF Form 1362): Provide biographical sketches of the Director, Associate Director(s), other research team leaders, and other key faculty committed to the ERC at the pre-proposal stage. (maximum length, two pages each).

E. Facilities and Equipment (NSF Form 1363) This form should support the description of the infrastructure of the ERC in the body of the pre-proposal by describing the equipment and facilities available to support the ERC.

F. Current and Pending Support (NSF Form 1239) for the Director, Associate Director(s) other members of the leadership team, and key faculty.

SUBMISSION OF THE PRE-PROPOSAL

Twenty copies of the pre-proposal, including one copy bearing the signed cover page, are required. The original signed copy should be printed on one side only and not bound. The remaining copies should be printed on both sides of the page and bound securely on the entire left side. Contrary to NSF guidelines, **they should not be stapled as staples do not hold their usual bulk and they should not be fastened with an elastic band, clip or other temporary means.**

The pre-proposal must be mailed to arrive at the following address by the deadline, **5:00 p.m**., **January 14, 1999.**

National Science Foundation (PPU)
Announcement Number NSF 98-146, Engineering Research Centers
4201 Wilson Boulevard, Room P60
Arlington, VA 22230

One information copy, not the original, should be sent to:

Lynn Preston, ERC Program Team Leader and
Deputy Division Director
Division of Engineering Education and Centers
National Science Foundation
4201 Wilson Boulevard, Suite 585
Arlington, VA 22230

All pre-proposals submitted in response to this announcement, which do not follow page, font, and appendix requirements, will be returned to the proposer without review.

SUMMARY OF REQUIREMENTS

{PRIVATE} Topic	**Pre-Proposal**	**Full-Scale Proposal**

Requirements		
Commitment of Industrial Funds	No	Yes
University Cost Sharing by Lead and any Long-Term Core Partner Universities	No	Yes
Cost Sharing by Research and Connectivity Institutions	No	No
Identification of Research Outreach Partners	Year one only	Year one only
Submission Requirements		
Letter of Intent	Helpful, Not Mandatory, Due November 2, 1998	No
Pre-Proposal/Full-Scale Proposal Due Dates	January 14, 1999	June 30, 1999
# of Copies	20	25
Differences in Format		
Inf. About PI (NSF Form 1225)	Yes	Yes
NSF Cover Sheet (Form 1207)	Yes	Yes
FastLane Submission of 1207	Yes	Yes
FastLane Submission of Proposals	No	No
Table of Contents	Yes	Yes
List of Academic Participants	Yes	Yes
List of Interested Industrial & Other Partners	Yes	N/A
List of Committed and Interested Industrial & Other Partners	N/A	Yes
Project Summary (Form 1358)	Yes	Yes
Executive Summary	One page	Two pages
Narrative	20 pages, including charts, etc.	45 pages, including charts, etc.

Draft Intellectual Property Policy	No	Yes
Appendices		
Letters Confirming Academic Commitment to ERC, No Cost Sharing	Yes	No
Letters Confirming Academic Commitment to ERC, Cost Sharing Required	No	Yes
Letters Indicating Industrial Interest	Yes	OK
Letters Confirming Industrial Involvement and Support	No	Yes
Budget – Years 1 only (Form 1030)	Yes	N/A
Budget – Years 1, 2, 3, 4, and 5 separately (Forms 1030)	No	Yes
Budget – Sum of Years 1-5, (Form 1030)	No	Yes
Financial Plan (Year 1 only)	No	Yes
Bio Sketches, (Form 1362)	Yes	Yes
Facilities & Equip, (Form 1363)	Yes	Yes
Current & Pending Support, (Form 1239)	Yes	Yes
Justification for Secretarial & Administrative Support	No	Yes

INQUIRIES

For general inquiries about the ERC Program, the ERC concept, and this announcement, contact:

Lynn Preston, Deputy Division Director and ERC Program Team Leader
Engineering Education and Centers (EEC) Division
Directorate for Engineering
National Science Foundation
4201 Wilson Boulevard, Suite 585
Arlington, VA 22230
Telephone: 703- 306-1380
FAX: 703-306-0326 or 0290
email: lpreston@nsf.gov

For more specific guidance in particular technical areas, contact one or more of the following NSF Program

Directors (PDs) who serve as the ERC PDs for current Engineering Research Centers:

Cheryl Cathey, EEC. Product development, chemical engineering, biochemical/biomedical engineering (ccathey@nsf.gov) 703-306-1380

Delcie Durham, Division of Design, Manufacture, and Industrial Innovation, Division of Design, Manufacture, and Industrial Innovation (DMII), manufacturing, and material processing. (ddurham@nsf.gov) 703-306-1390, ext. 5285.

Frederick Heineken, Division of Bioengineering and Environmental Systems (BES), biochemical engineering. (fheineke@nsf.gov) 703-306-1320, ext. 5017

John Hurt, EEC. Materials engineering, including electronic materials and materials. (jhurt@nsf.gov) 703-306-1380.

Rajinder Khosla, Division of Electrical and Communications Systems (ECS), electrical engineering, imaging, and multimedia. (rkhosla@nsf.gov) Electrical engineering, visualization, solid state electronics. 703-306-1390, ext. 5262.

George Lea, (ECS) Computational engineering and fluid dynamics. (glea@nsf.gov) 703-306-1339, ext. 5049

Tapan Mukherjee, EEC. Chemical/biochemical engineering, polymeric and composite materials engineering, renewable energy, minerals and metals, water supply and purification, and environment engineering (tmukherj@nsf.gov) 703-306-1383

Joy Pauschke, EEC. Structural engineering and civil and mechanical infrastructure systems, and ERC education programs. (jpauschk@nsf.gov) 703-306-1380

Mary Poats, EEC (for information on post-award ERC Program supported summer research experiences for undergraduates from non-ERC institutions and minority outreach programs in ERCs) (mpoats@nsf.gov) 703-306-1380

Engineering Research Centers

The list below includes the names of the Engineering Research Centers currently supported by NSF and those that have graduated from NSF support to self sufficiency. Included in that list are the names of the NSF Program Directors who serve as the lead and associate members of the NSF oversight team for each ERC. Descriptions of these ERCs are available on the ERC WWW Home Page as well as through direct linkages to each ERC's home page as indicated below. New ERCs to be awarded in FY 1998 will be announced on the ERC WWW Home Page during the summer as the awards are made.

Bioengineering

Neuromorphic Systems Engineering Center at the *California Institute of Technology*. (FY 1995)

Center Director: Demetri Psaltis
Deputy Director: Pietro Perona
Main Telephone: 626-395-6255

http//www.erc.caltech.edu/

ERC and other NSF Program Directors: John Hurt (EEC), Kishan Baheti (ECS) and Christopher Platt, Integrative Biology and Neuroscience, Directorate of Biological Sciences (IBN/BIO)

Biotechnology Process Engineering Center at the *Massachusetts Institute of Technology*. (An FY 1985 ERC reestablished in FY 1994)

Center Director: Douglas Lauffenburger
Main Telephone: 617-253-0805

http://www.web.mit.edu/bpec/

ERC and other NSF Program Directors: Cheryl Cathey (EEC) and Frederick Heineken, (BES)

Biofilm Engineering Research Center at *Montana State University*. (FY 1990*)

Center Director: J. William Costerton
Deputy Director: Phil Stewart
Main Telephone: 406-994-4770

http://www.erc.montana.edu

ERC Program Director: Frederick Heineken (BES)

Center for Engineered Biomaterials at the *University of Washington*. (FY 1996)

Center Director: Buddy D. Ratner
Deputy Director: Thomas A. Horbett
Main Telephone: 206-616-8646

http://www.uweb.engr.washington.edu/uweb/uweb.html

ERC and other NSF Program Directors: Tapan Mukherjee (EEC), Cheryl Cathey (EEC) and Janie Fouke (BES)

Design and Manufacturing

ERC for Environmentally Benign Semiconductor Manufacturing at the *University of Arizona* in partnership with *MIT and Stanford University*, an ERC supported by NSF and the Semiconductor Research Corporation (SRC). **(**FY 1996)

Center Director: Farhang Shadman
Associate Director: Raphael Reif (MIT)
Main Telephone: 520-621-6051

http://www.erc.arizona.edu

ERC and other NSF Program Directors: John Hurt (EEC), Daniel Herr, Semiconductor Research Corporation (SRC) and Maria Burka Chemical and Thermal Systems (CTS)

Center for Innovation in Product Development at the *Massachusetts Institute of Technology*. (FY 1996)

Center Director: Warren Seering

Executive Director: Conger Gabel, on loan from the Xerox Corporation
Main Telephone: 617-253-3645

http//web.mit.edu/cipd/

ERC and other NSF Program Directors: Cheryl Cathey (EEC), Joe Hennessey (DMII), and Susan Sanderson, Social, Behavioral and Economic Research, Directorate for Social Behavioral and Economic Sciences (SBER/SBE)

ERC for Reconfigurable Machining Systems at the *University of Michigan.*
(FY 1996)

Center Director: Yoram Koren
Deputy Director: A. Galip Ulsoy
Main Telephone: 313-764-3312

http://www.erc.engin.umich.edu

ERC and other NSF Program Directors: Joy Pauschke (EEC), Delcie Durham (DMII), and Ming Leu (DMII)

ERC for Computational Field Simulation at *Mississippi State University.*
(FY 1990*)

Center Director: Donald Trotter
Main Telephone: 601-325-8278

http://www.erc.msstate.edu/

ERC and other NSF Program Directors: George Lea (ECS), Joy Pauschke (EEC), and John VanRosendale, Advanced Scientific Computing, Directorate for Computer and Information Science and Engineering (ASC/CISE)

Center for Collaborative Manufacturing at *Purdue University.* (An FY 1985 ERC reestablished in FY 1994**)

Center Director: James J. Solberg
Assistant Director: David Anderson
Main Telephone: 765-494-7715

http://www.erc.ecn.purdue.edu/erc

ERC and other NSF Program Directors: Lynn Preston (EEC) and Susan Sanderson (SBER/SBE)

Optoelectronics, Microelectronics, and Information Technology

Data Storage Systems Center at *Carnegie Mellon University.* (FY 1990*)

Center Director: Mark H. Kryder
Deputy Director: James E. Williams, Jr.
Main Telephone: 412-268-3513

http://www.ece.cmu.edu/afs/ece/www/httpd_doc/research/dssc.html

ERC and other NSF Program Director: John Hurt (EEC) and Rajinder Khosla (ECS)

ERC for Low-Cost Electronics Packaging at *Georgia Institute of Technology.* (1995)

Center Director: Rao Tummala
Main Telephone: 404-894-9097

http://www.ece.gatech.edu/research/PRC/

ERC and other NSF Program Directors: John Hurt (EEC) and Rajinder Khosla (ECS)

Integrated Media Systems Center at the *University of Southern California.* (FY 1996)

Center Director: C.L. (Max) Nikias
Deputy Director: Alexander Sawchuk
Main Telephone: 213-740-0877

http://www.imsc.usc.edu/

ERC and other NSF Program Directors: John Hurt (EEC), and Gary Strong, Information Robotics and Intelligent Systems (IRI/CISE)

Materials Processing for Manufacture

ERC for Particle Science and Technology at the *University of Florida.* (FY 1994)

Center Director: Brij M. Moudgil
Main Telephone: 352-846-1194

http://www.erc.ufl.edu

ERC and other NSF Program Directors: Tapan Mukherjee (EEC), Associate Program Director to be determined.

Center for Interfacial Engineering at the *University of Minnesota.* (FY 1988**)

Center Director: D. Fennell Evans
Main Telephone: 612-626-2230

http://www.cie.umn.edu

ERC and other NSF Program Directors: Tapan Mukherjee (EEC) and Robert Wellek (CTS)

Center for Advanced Electronic Materials Processing at *North Carolina State University and other North Carolina Institutions.* (FY 1988**)

Center Director: John R. Hauser
Main Telephone: 919-515-5012

http://www2.ncsu.edu/ncsu/CIL/aemp/httnl/aemp.html

ERC and other NSF Program Directors: John Hurt (EEC) and Rajinder Khosla (ECS)

Resource Recovery and Utilization

Offshore Technology Research Center at *Texas A&M University and The University of Texas at Austin.* (FY 1988**)

Center Director: Jose Roesset
Associate Director: Skip Ward
Telephone: 409-845-6000

http://www.otrc5.tamu.edu/

ERC and other NSF Program Directors: Joy Pauschke (EEC) and Ron Sack, Civil and Mechanical Systems (CMS)

Self-Sustaining ERCs graduated from NSF Support in FY 1999 or Earlier

Center for Telecommunications Research at *Columbia University* (FY 1985)

Center Director: Thomas E. Stern
Main Telephone: 212-854-3119

http://www.ctr.columbia.edu

Institute for Systems Research at the *University of Maryland.* (An FY 1985 ERC reestablished in FY 1994)

Center Director: Gary W. Rubloff
Main Telephone: 301-405-6632

http://www.isr.umd.edu/

Advanced Combustion Engineering Research Center at *Brigham Young University and the University of Utah.* (FY 1986)

Center Director: Thomas H. Fletcher
Main Telephone: 801-378-2804

http://www.acerc.byu.edu

Engineering Design Research Center (Institute for Complex Engineered Systems) at *Carnegie Mellon University. (* FY 1986)

Center Director: Daniel P. Siewiorek
Institute Director: Pradeep Khosla
Main Telephone: 412-268-2272

http://www.edrc.cmu.edu/

Center for Compound Semiconductor Microelectronics at the *University of Illinois, Urbana-Champaign.* (FY 1986)

Center Director: Stephen Bishop
Main Telephone: 217-333-3097

http://www.ccsm.uiuc.edu/ccsm/

Center for Advanced Technology for Large Structural Systems at *Lehigh University.* (FY 1986)

Center Director: John W. Fisher

Main Telephone: 215-758-3524

http://www.lehigh.edu/~inatl/inatl.html

ERC for Net Shape Manufacturing at *The Ohio State University*. (FY 1986)

Center Director: Taylan Altan
Main Telephone: 614-292-9267

http://nsmwww.eng.ohio-state.edu

Optoelectronic Computing Systems Center at the *University of Colorado and Colorado State University*. (FY 1987)

Center Director: John Neff
Main Telephone: 303-492-7967

http://www-ocs.colorado.edu

Center for Emerging Cardiovascular Technologies at *Duke University*. (FY 1987)

Center Director: Olaf von Ramm
Main Telephone: 919-660-5137

http://bme-www.mc.duke.edu/cect.html

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[1]An engineered system is derived from integrating a number of components, processes, and devices to perform a function. The system may be living or inanimate in origin. It must be complex and challenging enough to justify a ten-year program of research. Analysis, modeling, or development of the individual components of a system, without their integration into a complex engineered system, is not an appropriate focus for an ERC.

[2]The results of evaluations of the effectiveness of ERC graduates in industry and the effectiveness of ERC industrial collaboration and technology transfer activities are available on the ERC WWW Home Page at the following address: http://www.eng.nsf.gov/eec/erc.htm

[3]Proof-of-concept testbeds in ERCs are used to explore an ERC's next-generation engineered system to determine if all components work together as planned and the system is feasible. These testbeds help to ensure that the research outcomes are integrated and tested and supply a framework for faculty, students, and industry representatives to work together and gain a better understanding of the realities of the system they are exploring and demonstrating. They often lead to new directions in research as more barriers surface in the realities of proving the concept.

[4] See the budget section of this announcement for guidance on overhead charges on this dispersal.

[5] The Associate Director(s) must be a faculty member. If a multi-university ERC is proposed, it is expected that the lead Principal Investigator at each core-partner institution will be an Associate Director.

[6] Advances or deliverables produced by an ERC include fundamental knowledge advances, enabling or intermediate technology advances needed to achieve the ERC's engineered systems level goals, and advances at the engineered systems level.

[7] Government agencies that will use the research and medical or other types of practitioners who will participate for purposes of technology transfer, as opposed to research, should be listed here.

[8] The date of establishment of the ERC.

* Scheduled for self-sufficiency in FY 2000.
** Scheduled for self-sufficiency in FY 1999.

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Grantees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities, and persons with disabilities to compete fully in its programs, In accordance with federal statutes, regulations, and NSF policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

Facilitation Awards for Scientists and Engineers with Disabilities (FASED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF -supported projects. See the program announcement or contact the program coordinator at (703) 306-1636.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation regarding NSF programs, employment, or general information. TDD may be accessed at (703) 306-0090 or through FIRS on 1-800-877-8339.

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, " Principal Investigator/Proposal File and Associated Records," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associate Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Reports Clearance Officer; Information Dissemination Branch, DAS; National Science Foundation; Arlington, VA 22230.

YEAR 2000 REMINDER

In accordance with Important Notice No. 120 dated June 27, 1997, Subject: Year 2000 Computer Problem, NSF awardees are reminded of their responsibility to take appropriate actions to ensure that the NSF activity being supported is not adversely affected by the Year 2000 problem. Potentially affected items include: computer systems, databases, and equipment. The National Science Foundation should be notified if an awardee concludes that the Year 2000 will have a significant impact on its ability to carry out an NSF funded activity. Information concerning Year 2000 activities can be found on the NSF web site at http://www.nsf.gov/oirm/y2k/start.htm .

This program is described in the Catalog of Federal Domestic Assistance category 47.041, Engineering Grants.

OMB# 3145-0058
PT 34,04
KW 0600000, 0502042

NSF 98-146
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